AGRIUM CONDA PHOSPHATE OPERATIONS (PWS 6150003)
SOURCE WATER ASSESSMENT FINAL REPORT

August 26, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for Agrium Conda Phosphate Operations, Soda Springs, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the public water system (PWS).**

The Agrium Conda Phosphate Operations (PWS #6150003) is classified as a non-community, non-transient water system. The drinking water system consists of five wells (Well #1, Well #7, Well #8, Well #9, and Well #10). The system serves 150 persons through 17 connections. The system uses an average of 206,000 gallons per day of water in the summer and 1.09 million gallons per day of water in the winter. Winter use is higher because all wells are continuously pumped to prevent pipes from freezing.

The potential contaminant sources within the delineation capture zones include a Resource Conservation Recovery Act (RCRA) site and a railroad transportation corridor. If an accidental spill occurred from this corridor, inorganic chemical (IOC) contaminants, volatile organic chemical (VOC) contaminants, synthetic organic chemical (SOC) contaminants, or microbial contaminants could be added to the aquifer system. Other contaminant sources identified within the delineated areas that may contribute to the overall vulnerability of the water sources were phosphate mines. A complete list of potential contaminant sources is provided with this assessment (Table 1 through Table 5).

For the assessment, a review of laboratory tests was conducted using the Idaho Drinking Water Information Management System (DWIMS) and the State Drinking Water Information System (SDWIS). Total coliform bacteria were detected in the distribution system between July 1994 and June 1997. Since July 1997, subsequent samples have not detected total coliform bacteria in the distribution system. The IOCs barium, cadmium, chromium, fluoride, nitrate, and selenium have been detected in the drinking water, but at levels below the maximum contaminant level (MCL) for each chemical. Nitrate has been detected above the MCL in Well #1 at 14.2 milligrams per liter (mg/L) in November 1995 and in Well #9 at 22.1 mg/L in May 2001. Well #1 and Well #9 automatically scored high susceptibility to IOCs because they exceeded the MCL for nitrate. Well #1 automatically scored high susceptibility to SOCs because atrazine was detected in the drinking water.

The capture zones for the wells intersect a priority area for the IOC, nitrate. The priority area is where greater than 25% of the wells/springs show nitrate values greater than 5 mg/L. The capture zones for Well #1, Well #9, and Well #10 intersects a priority area for the SOC atrazine. The organic priority area is where greater than 25% of the wells in the area show levels greater than 1% of the primary standard or other health standards (MCL is 0.003 mg/L for atrazine). Atrazine is a widely used herbicide for control of broadleaf and grassy weeds. Atrazine was detected in Well #1 at a concentration of 0.000.379 mg/L in September 1997.

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), SOC (i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of total susceptibility, Well #1 rated automatically high for IOCs, high for VOCs, automatically high for SOCs, and high for microbials. Although land use scores were moderate for IOCs, VOCs, and SOCs, and low for microbials, system construction and hydrologic sensitivity both rated high, elevating overall scores. The automatically high ratings were due to a detection of nitrate (IOC) above the MCL and the presence of atrazine in the well.

In terms of total susceptibility, Well #7 rated high for IOCs, VOCs, SOCs, and microbials. System construction and hydrologic sensitivity scores were both high and land use scores were moderate for IOCs, VOCs, and SOCs, and low for microbials.

In terms of total susceptibility, Well #8 rated high for IOCs, VOCs, SOCs, and microbials. System construction and hydrologic sensitivity scores were both high and land use scores were high for IOCs, moderate for VOCs and SOCs, and low for microbials.

In terms of total susceptibility, Well #9 rated automatically high for IOCs and high for VOCs, SOCs, and microbials. System construction and hydrologic sensitivity scores rated high. Land use scores were moderate for IOCs, VOCs, SOCs, and low for microbials.

In terms of total susceptibility, Well #10 rated high for IOCs, VOCs, SOCs, and moderate for microbials. System construction scores were high and hydrologic sensitivity scores were moderate. Land use scores were moderate for IOCs, VOCs, SOCs, and low for microbials.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Agrium Conda Phosphate Operations, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Also, any new sources that could be considered potential contaminant sources in the wells' zones of contribution should also be investigated and monitored to prevent future contamination. No potential contaminants (pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 50 feet of the wells. Land uses within most of the source water assessment area are outside the direct jurisdiction of the Agrium Conda Phosphate Operations. Therefore partnerships with state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. There are multiple resources available to help water systems implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Caribou County Soil and Water Conservation District.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR AGRIUM CONDA PHOSPHATE OPERATIONS, SODA SPRINGS, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the public water system (PWS).**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Agrium Conda Phosphate Operations (PWS #6150003) is classified as a non-community, non-transient water system. The drinking water system consists of five wells. The system serves 150 persons through 17 connections. The system uses an average of 206,000 gallons per day of water in the summer and 1.09 million gallons per day of water in the winter. Winter use is higher because all wells are continuously pumped to prevent pipes from freezing.

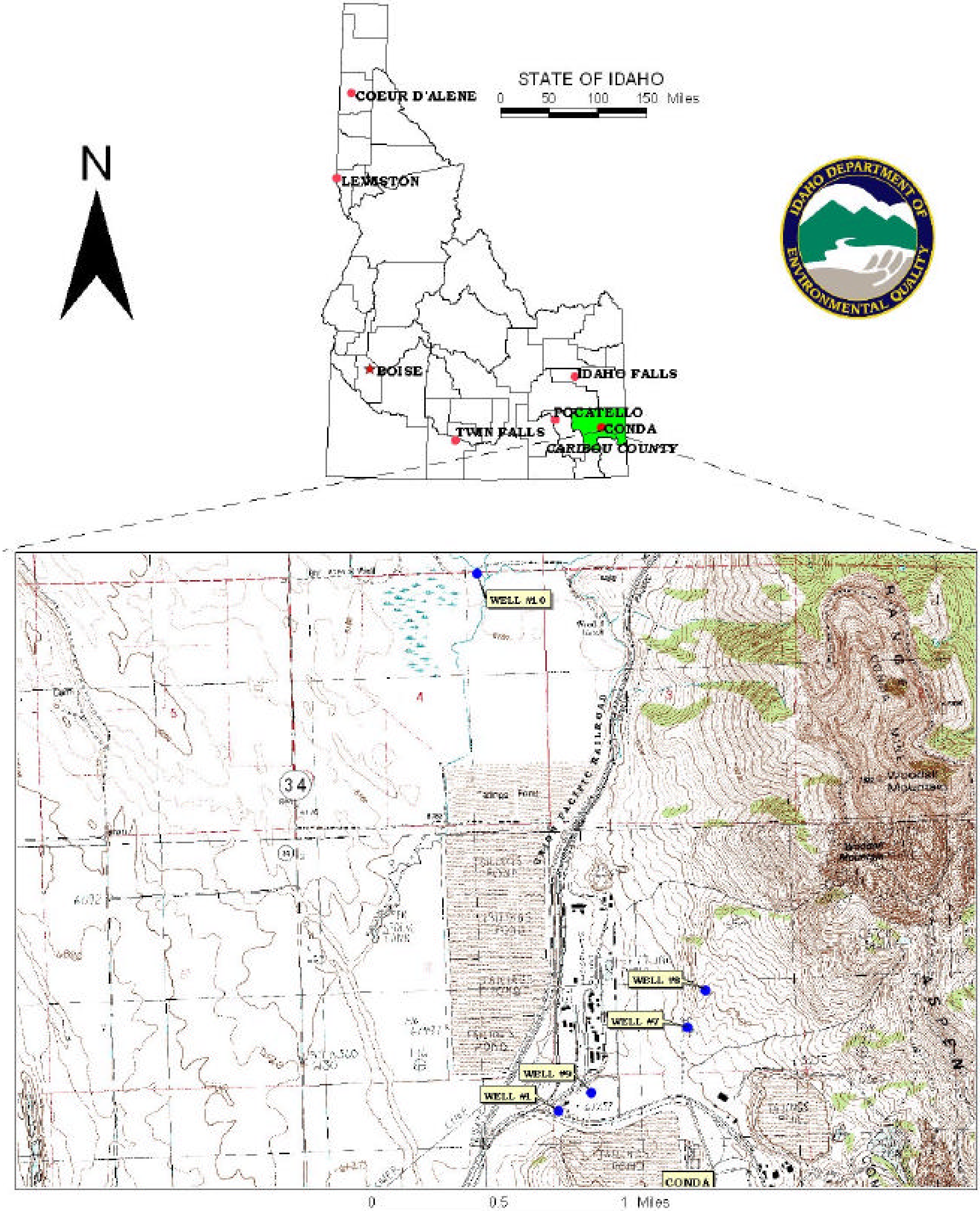
Total coliform bacteria were detected in the distribution system between July 1994 and June 1997. Since July 1997, subsequent samples have not detected total coliform bacteria in the distribution system. The inorganic chemicals (IOCs) barium, cadmium, chromium, fluoride, nitrate and selenium have been detected in the drinking water, but at levels below the maximum contaminant level (MCL) for each chemical. Nitrate has been detected above the MCL in Well #1 at 14.2 milligrams per liter (mg/L) in November 1995 and in Well #9 at 22.1 mg/L in May 2001. Well #1 and Well #9 automatically scored high susceptibility to IOCs because they exceeded the MCL for nitrate. Well #1 automatically scored high susceptibility to synthetic organic chemicals (SOCs) because atrazine was detected in the drinking water.

The capture zones for the wells intersect a priority area for the IOC, nitrate. The priority area is where greater than 25% of the wells/springs show nitrate values greater than 5 mg/L. The capture zones for Well #1, Well #9, and Well #10 intersects a priority area for the SOC, atrazine. The organic priority area is where greater than 25 % of the wells in the area show levels greater than 1% of the primary standard or other health standards (MCL is 0.003 mg/L for atrazine). Atrazine is a widely used herbicide for control of broadleaf and grassy weeds. Atrazine was detected in Well #1 at a concentration of 0.000379 mg/L in September 1997.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the public water system's zones of contribution. WGI used a conceptual computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Soda Springs hydrologic province in the vicinity of the Agrium Conda Phosphate Operations. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records, well logs (when available) and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

FIGURE 1. Geographic Location of Agrium Conda Phosphate Operations



Hydrogeologic Conceptual Model

The Bear River originates in the Uinta Mountains of northern Utah and winds its way through over 500 miles of Wyoming, Idaho, and Utah to terminate in a freshwater bay of the Great Salt Lake just 90 miles west of its source (Dion, 1969, p. 6). The Bear River enters Idaho near Border, Wyoming and flows along the north edge of the Bear River Plateau. Flowing north through the Bear River – Dingle Swamp hydrologic province, it passes into the Soda Springs hydrologic province east of the Bear River Range.

Upon entering the Gem Valley – Gentile Valley hydrologic province, it swings south. Now west of the Bear River Range, the river passes through the Oneida Narrows into the Cache Valley hydrologic province. Over most of its course through Idaho, the Bear River is gaining and in direct hydraulic communication with the major aquifer systems of the four hydrologic provinces. The exception is a small reach between the cities of Alexander and Grace where it is generally losing and is perched over the regional fractured basalt aquifer (Dion, 1969, p. 30).

Ground water in the Bear River Basin is found in Holocene alluvium, Pleistocene basalt, and rocks of the "Pliocene (?)" [sic] Salt Lake Formation, pre-Tertiary undifferentiated bedrock, and possibly the "Eocene (?)" [sic] Wasatch Formation (Dion, 1969, pp. 15 and 16). Rocks of the Salt Lake Formation, which include freshwater limestone, tuffaceous sandstone, rhyolite tuff and poorly-consolidated conglomerate, outcrop along the major valley margins and may underlie the valley-fill alluvium (Dion, 1969, pp. 16 and 17). Many of the wells drilled into this formation do not yield water. The few wells that do produce water yield as much as 1,800 gal/min from beds of sandstone and conglomerate.

The Wasatch Formation is restricted to the Bear Lake Plateau and small areas northwest of Bear Lake (Dion, 1969, p. 17). The formation is composed largely of tightly cemented conglomerate and sandstone with smaller amounts of shale, limestone, and tuff. The primary pore space is typically impermeable. Water movement may occur through joints and fractures or more permeable zones that are thought to exist along the relatively flat-lying formation (Dion, 1969, p. 17). Springs occur at the margins of the formation.

Precipitation in the basin ranges from 10 in./yr on the floor of Bear Lake Valley to over 45 in./yr on the Bear River Range (Dion, 1969, pp. Vll and 11). Applied over the entire basin, precipitation amounts to approximately 2.3 million acre-feet annually. Precipitation is also the principal source of recharge to the basin's aquifers in conjunction with spring snowmelt and runoff, irrigation seepage, and canal losses.

Natural ground water discharge is by flow to the Bear River, springs, seeps along river banks, and evapotranspiration in large marshy areas (Dion, 1969, p. VIII). Some discharge may also occur by way of underflow to the Portneuf River drainage through basalt flows at Tenmile pass and near Soda Point.

Ground water is obtained from both springs and wells in the Bear River Basin. Hundreds of springs issue primarily from fractures and solution openings in the bedrock on the margins of the basin (Dion, 1969, p. 47). Water production from wells in the four hydrologic provinces is primarily from alluvial and basalt aquifers; however, some wells tap conglomerate, sandstone, limestone and shale aquifers of the Salt Lake and possibly the Wasatch formations (Dion, 1969, p. VII).

Soda Springs

The Soda Springs hydrologic province occupies approximately 220 square miles north of the Bear River – Dingle Swamp hydrologic province. The Basin and Range physiographic province is generally north to south trending. The mean annual precipitation is 15 to 16 inches, with the majority falling as snow during the winter months (IWRB, 1981, p. 16). Mountains composed of pre-Tertiary formations of carbonate, quartzite, shale, and sandstone bound the province to the northeast and southwest (Dion, 1969, p. 18, and IWRB, 1981, pp. 15-16). The major geologic feature is the Blackfoot Lava Field, which is marked with large northwest trending scarps (Dion, 1974, p.9). The province is marked with extensive faulting surrounding the city of Soda Springs (Dion, 1974, Figure 4).

The valley is filled with Quaternary sediments and tufa and Quaternary and Tertiary basalts (Dion, 1974, Figure 4). Valley-fill sediments are generally thin and produce limited quantities of water. The tufa produces upward of 25 ft^3/sec of water in the form of mineral springs. Basalt flows extending from the Blackfoot Reservoir to south of Soda Springs are the principal aquifer yielding 500 to 3,500 gallons per minute to wells (Dion 1974, p. 9 and Table 1). The total thickness of the basalt ranges from a thin sheet near the flows margin to several hundred feet near the center. The Salt Lake Formation

sandstones, limestones, shales and pre-Tertiary undifferentiated bedrock underlie the valley fill and form the surrounding mountains (Dion, 1969, p. 16).

The primary source of ground water recharge is leakage from Blackfoot Reservoir, precipitation, and irrigation. A 3-mile reach of the Blackfoot River directly above the reservoir is also thought to contribute recharge (Dion 1974, p. 12).

Ground water is discharged from the basalt aquifer through springs, evapotranspiration, and underflow to the Bear River and the eastern end of Soda Point Reservoir. Ground water is also discharged by irrigation and domestic wells (Dion, 1974, p. 14).

The ground water flow direction south of Blackfoot Reservoir is southwest past the city of Soda Springs and then toward the Bear River and Soda Point Reservoir (Dion, 1969, p. 19).

Modeling Approach

Both an analytic element model and the calculated fixed-radius method were used for PWS wells within the Soda Springs hydrologic province. The decision of whether to use the refined method or the fixed-radius method was based on the available information and the amount of hydrologic uncertainty associated with each of the aquifers affected by the PWS wells. PWS wells completed in the Blackfoot basalt aquifer were delineated with WhAEM (Kraemer et al., 2000). PWS wells completed in the sedimentary rock aquifers were evaluated using the calculated fixed-radius method.

The following model input parameters were used for Well #1, Well #9, and Well #10. The base case hydraulic conductivity of 676 ft/day is the geometric mean of estimates derived from the analysis of specific capacity data using the method of Walton (1962, p. 12). Areal recharge was set at 1.58 inches/year (0.00036 ft/day). The effective porosity is 0.1, which is the default value presented in Table F-3 of the Idaho Wellhead Protection Plan for Columbia River Basalt (IDEQ, 1997, p. F-6). Base elevation of the aquifer was set at the elevation of the bottom of Well #1 (5,814 feet msl). The aquifer thickness (142 feet) is the approximate average for the wells.

The production rates for Well #1, Well #9, and Well #10 were set to one-fourth of the average winter production for the PWS in the calibration run. The larger winter production rate was used to maintain conservatism.

The calculated fixed-radius method was used to delineate the capture zone for Well # 7 and Well #8. The fixed radii for the 3-, 6-, and 10-year capture zones were calculated using equations presented by Keely and Tsang (1983) for the velocity distribution surrounding a pumping well.

Well #7 and Well #8 are completed within a limestone aquifer that is most likely of the Salt Lake Formation. Hydraulic conductivities of 15 (Rasmussen, 1964; Morris and Johnson, 1967), and 42 ft/day (Segol and Pinder, 1976, pp. 65-70.) were used for these wells. The effective porosity (0.2) and uniform hydraulic gradient (0.003) are the default values presented in Table F-3 of the Idaho Wellhead Protection Plan for mixed volcanic and sedimentary rocks, primarily sedimentary rocks (IDEQ, 1997, p. F-6). The aquifer thickness used for Well #7 was 361 feet and 160 feet for Well #8.

The delineated source water assessment area for Well #1, Well #9, and Well #10 can be described as having an irregular triangular shape. The wells' capture were limited to less than three years of travel, because they were truncated at the topographic divide between the Snake River and Bear River drainages. For Well #7 and Well #8, fixed-radius calculations resulted in radial distances of approximately 555 feet for the 3-year TOT, 925 feet for the 6-year TOT, and 1330 feet for the 10-year TOT (Figure 2 through Figure 6, Appendix A). The actual data used by WGI in determining the source water assessment delineation area is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineation areas. These include a Resource Conservation Recovery Act (RCRA) site, phosphate mines, and a railroad. A complete list of potential contaminant sources is provided with this assessment (Table 1 through Table 5).

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in April and May 2002. The first phase involved identifying and documenting potential contaminant sources within the Agrium Conda Phosphate Operations source water assessment areas through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas. This task was undertaken with the assistance of Mr. Monty Johnson. At the time of the enhanced inventory, no additional potential contaminant sources were found within the delineated source water area. Maps with well locations, delineated areas and potential contaminant sources are provided with this report (Appendix A; Figure 2, 3, 4, 5, 6). Each potential contaminant source has been given a unique site number that references tabular information associated with the public water wells (Appendix A; Tables 1, 2, 3, 4, 5).

Section 3. Susceptibility Analyses

The susceptibility of the wells to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the wells, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix B contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: These factors are surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Well # 1, Well #7, Well #8, and Well #9 rated high for hydrologic sensitivity, while Well #10 rated moderate (Table 7). Except for Well #10, the area surrounding each of the wells is composed of moderately to highly drained soils. The vadose zones of each well, except for Well #9 (mostly clay and therefore less permeable), is either soft or medium-hard limestone or fractured basalt, which has a high degree of permeability. In each well, the depth to the water table is less than 300 feet, and no aquitard is present.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. Table 6 contains a summary of well construction data.

Well #1 rated high for system construction. Points were added to the score because the well is not vented, the casing and annular seal do not extend into low permeability units, and the highest production of water comes from less than 100 feet below the static water table.

Well #7 rated high for system construction. Points were added to the score because the casing and annular seal do not extend into low permeability units, the casing is too thin, and the highest production of the well is not more than 100 feet below the static water level. In addition, it is unknown if the wellhead and surface seal are maintained, or if the wellhead is protected from surface flooding.

Well #8 rated high for system construction. The well is located outside of the 100-year floodplain and its highest production comes from more than 100 feet below the water table. Points were added to the score because the annular seal extends into limestone gravel, the casing is too thin, and it is unknown if the wellhead and surface seal are maintained or if it is protected from surface flooding.

Well #9 rated high for system construction. The well is located outside of the 100-year floodplain. Points were added to the score because the casing and annular seal do not extend into low permeability units, the highest production comes from less than 100 feet below static water levels, the casing was too thin, and it is unknown if the wellhead and surface seal are maintained. In addition, it is unknown if the wellhead is protected from surface flooding.

Well #10 rated high for system construction. No sanitary survey or well log was available during this analysis, and scores related to the missing information received the conservative highest ratings. The construction of Well #10 was completed in the early spring of 2001. The well is 348 feet deep. Twenty-inch-diameter steel casing was used in the construction, with 40-slot screen spanning the intervals from 61 to 86 ft-bgs and from 113 to 138 ft-bgs and 20-slot screen from 266 to 286 ft-bgs and from 313 to 340 ft-bgs. The upper three screened intervals are adjacent to basalt flows interfingered with cinder and sand. The bottom screen is adjacent to water-bearing sandstone. The well is located outside of the 100-year floodplain. Due to missing information, it is unknown if the wellhead and surface seal are maintained, if the casing and annular seal extend into low permeability units, if the wellhead is protected from surface flooding, or if the highest production comes from more than 100 feet below the water table. If the sanitary survey and well logs had been available, scores might have been lower.

Table 6. Agrium Conda Phosphate Operations Well Construction Summary Information

Well	Well Depth (ft)	Water Table Depth (ft)	Casing: diameter/ Thickness (in)	Casing: Depth (ft)/ formation	Surface seal: depth (ft)/ formation	Screened Interval (ft)	Drill Year	Sanitary Survey Elements (A/B) [1]
Well #1	270	38	20/0.25 16/0.25	241/Basalt	29/Broken Lava	45-240	1964	No/No
Well #7	503	80	24/0.303 16/0.303	465/Medium Limestone	20/Medium Limestone	104-465	1988	NI/NI
Well #8	600	182	24/0.375 16/0.281	527/ Limestone	20/Lime-stone gravel	367-527	1992	No/NI
Well #9	255	35	20/0.25 16/0.375	255/Sand-stone & clay	25/Clay	40-100, 120-140, 180-220, 235-255	1999	Yes/NI
Well #10	348	NI	20/NI	348/Basalt & Sandstone	NI	61-86, 113-138, 266-286, 313-340	2001	NI/NI

[1] A = Well and surface seal in compliance; B = Protected from surface flooding; NI = no information was available

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead and if the well is designed to yield greater than 50 gallons per minute (gpm) a minimum of a 6-hour pump test is required. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. In this case, there was insufficient information available to determine if the wells meet all the criteria outlined in the IDWR Well Construction Standards.

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zones of water contribution are assessed to determine the well's susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The land use within the area surrounding the Agrium Conda Phosphate Operations wells is predominately non-irrigated agricultural land.

In terms of potential contaminant sources, the land use susceptibility ratings are as follows (Table 7): Well #1, Well #9, and Well #10 rated moderate for IOCs, VOCs, SOCs, and low for microbials. Well #7 rated moderate for IOCs, VOCs, and SOCs, and low for microbials. Well #8 rated moderate for IOCs and low for VOCs, SOCs, and microbials. The number and location of potential contaminant sources within each delineation contributed to the scores (see Appendix A, Tables 1-5).

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a potential contaminant sources within 50 feet of a wellhead will automatically lead to a high susceptibility rating despite the land use of the area because a pathway for contamination already exists. In this case, Well #1 automatically rated high for IOCs due to an MCL exceedance of nitrate and SOCs due to a detection of atrazine. Well #9 automatically rated high for IOCs due to an MCL exceedance of nitrate. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) contribute greatly to the overall ranking.

Table 7. Summary of Agrium Conda Phosphate Operations Susceptibility Evaluation

Drinking Water Sources	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Potential Contaminant Inventory and Land Use				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	H	M	M	M	L	H	H*	H	H*	H
Well #7	H	M	M	M	L	H	H	H	H	H
Well #8	H	M	L	L	L	H	H	H	H	H
Well #9	H	M	M	M	L	H	H*	H	H	H
Well #10	M	M	M	M	L	H	H	H	H	M

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H *= automatic high due to detection of atrazine (Well #1) and nitrate (Well #1 and Well #9) in tested water above maximum contaminant levels (MCL).

Susceptibility Summary

No VOCs have ever been tested in the wells. Total coliform bacteria were detected in the distribution system between July 1994 and June 1997. Since July 1997, subsequent samples have not detected total coliform bacteria in the distribution system. The IOC nitrate has been detected above the MCL in Well #1 (November 1995) and Well #9 (May 2001). In addition, selenium chloride, fluoride, barium, chromium, and cadmium have been detected, but at levels below the MCL for each chemical. The SOC atrazine was detected in Well #1 (September 1997).

In terms of total susceptibility, Well #1 automatically rated high for IOCs and SOCs and high for VOCs and microbials. Although land use scores were moderate for IOCs, VOCs, and SOCs, and for low microbials, system construction and hydrologic sensitivity both rated high, elevating overall scores. The automatically high ratings were due to a detection of nitrate above the MCL and the presence of atrazine in the well.

In terms of total susceptibility, Well #7 rated high for IOCs, VOCs, SOCs, and microbials. System construction and hydrologic sensitivity scores were both high, and land use scores were moderate for IOCs, VOCs, and SOCs, and low for microbials.

In terms of total susceptibility, Well #8 rated high for IOCs, VOCs, SOCs, and microbials. System construction and hydrologic sensitivity scores were both high, and land use scores were high for IOCs, moderate for VOCs and SOCs, and low for microbials.

In terms of total susceptibility, Well #9 rated automatically high for IOCs, and high for VOCs, SOCs, and microbials. System construction and hydrologic sensitivity scores were both high. Land use scores were moderate for IOCs, VOCs, SOCs, and low for microbials.

In terms of total susceptibility, Well #10 rated high for IOCs, VOCs, SOCs, and moderate for microbials. System construction scores were high and hydrologic sensitivity scores were moderate. Land use scores were moderate for IOCs, VOCs, SOCs, and low for microbials.

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed source water protection program will incorporate many strategies. For Agrium Conda Phosphate Operations, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. No potential contaminants (pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 50 feet of the wells. Land uses within most of the source water assessment area are outside the direct jurisdiction of the Agrium Conda Phosphate Operations, making collaboration and partnerships with state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, Caribou Soil Conservation and Water District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office	(208) 236-6160
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper, Idaho Rural Water Association, at 208-343-7001 (mlharper@idahoruralwater.com) for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

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Appendix A

Agrium Conda Phosphate Operations
Potential Contaminant Source Tables and Figures

Table 1. Agrium Conda Phosphate Operations, Well #1, Potential Contaminant Inventory

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Geothermal Mine	0–3	Database Inventory	IOC, VOC, SOC
2	Phosphate Mine	0–3	Database Inventory	IOC, VOC, SOC
	Tailings Pond	0–3	GIS Map	IOC, VOC, SOC
	Railroad	0–3	GIS Map	IOC, VOC, SOC, Microbials

[1] RCRA = Resource Conservation and Recovery Act

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 2. Agrium Conda Phosphate Operations, Well #7, Potential Contaminant Inventory

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Phosphate Mine	3–6	Database Search	IOC, VOC, SOC
	Railroad	3-10	GIS Map	IOC, VOC, SOC
	Tailings Pond	6–10	GIS Map	IOC, VOC, SOC

[1] RCRA = Resource Conservation and Recovery Act

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 3. Agrium Conda Phosphate Operations, Well #8, Potential Contaminant Inventory

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Phosphate Mine	6–10	Database Search	IOC, VOC, SOC
	Railroad	6–10	GIS Map	IOC, VOC, SOC
	Tailings Pond	6–10	GIS Map	IOC, VOC, SOC

[1] RCRA = Resource Conservation and Recovery Act

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 4. Agrium Conda Phosphate Operations, Well #9, Potential Contaminant Inventory

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Geothermal Mine	0–3	Database Search	IOC, VOC, SOC
2	Phosphate Mine	0–3	Database Search	IOC, VOC, SOC
	Tailings Pond	0–3	GIS Map	IOC, VOC, SOC
	Railroad	0–3	GIS Map	IOC, VOC, SOC, Microbials

[1] RCRA = Resource Conservation and Recovery Act

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

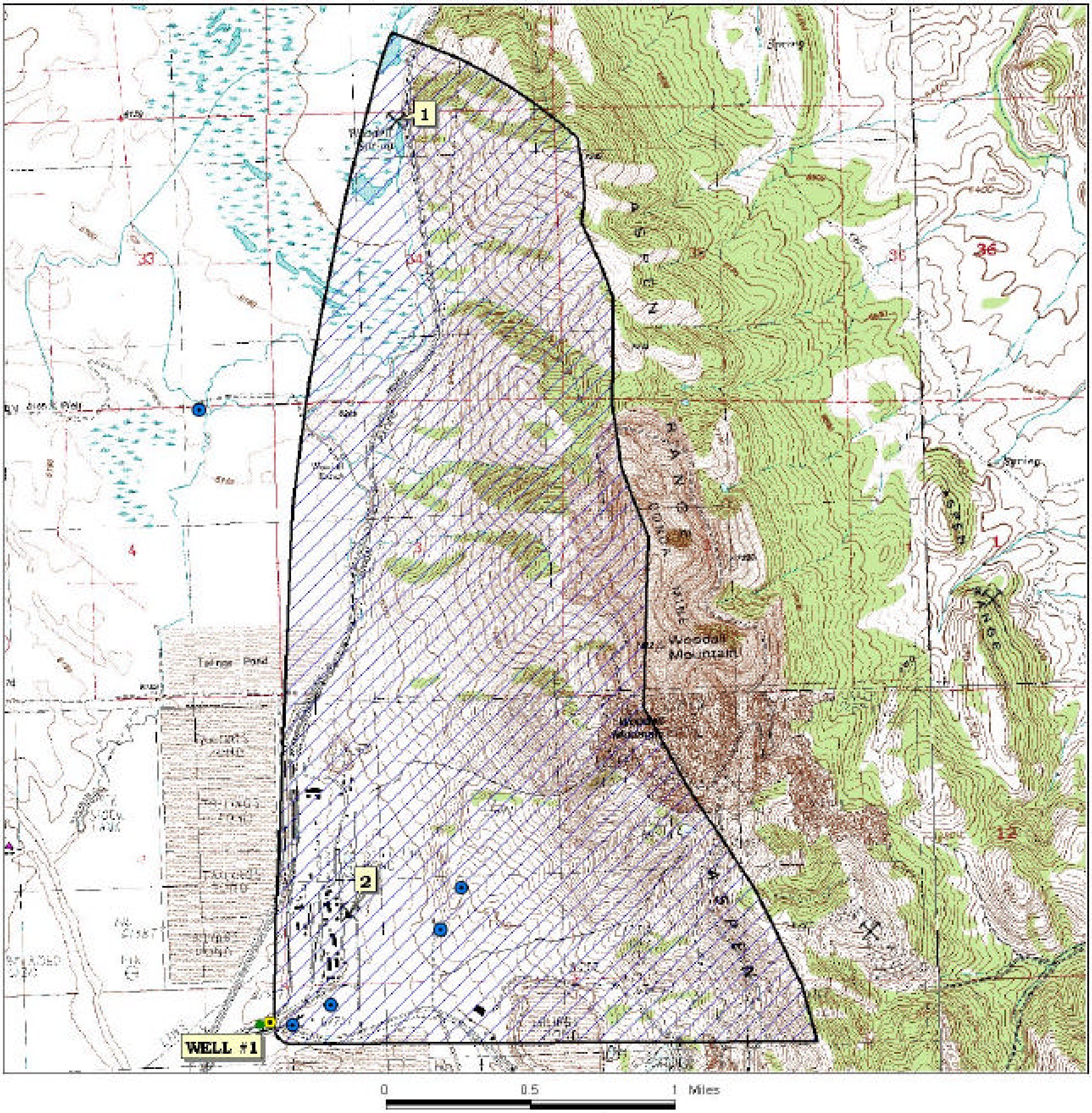
Table 5. Agrium Conda Phosphate Operations, Well #10, Potential Contaminant Inventory

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Phosphate Mine	0–3	Database Search	IOC, VOC, SOC
2	Phosphate Mine	0–3	Database Search	IOC, VOC, SOC
3	Geothermal Mine	0–3	Database Search	IOC, VOC, SOC
	Railroad	0–3	GIS Map	IOC, VOC, SOC, Microbials

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

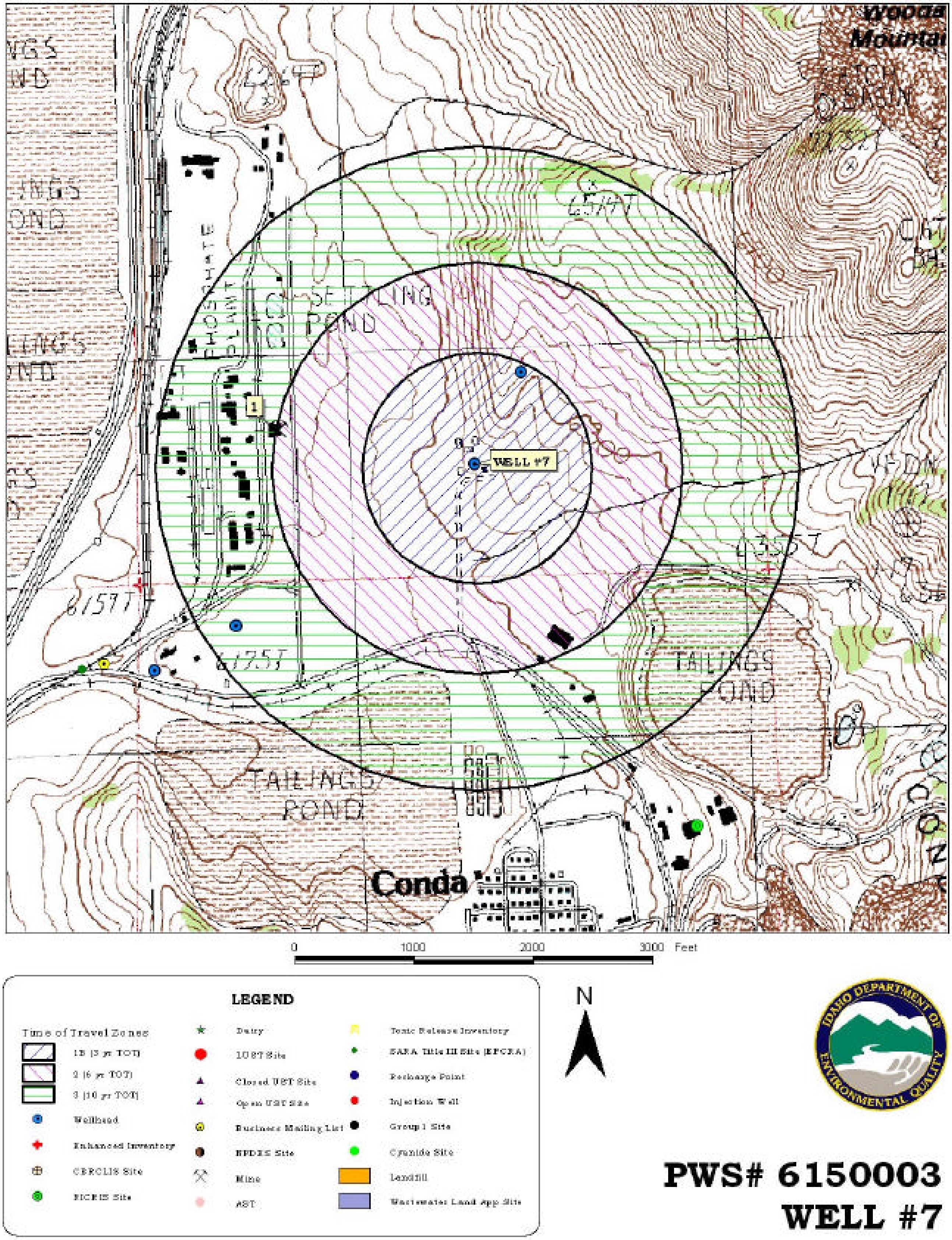
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

FIGURE 2. Agrium Conda Phosphate Operations Delineation Map and Potential Contaminant Source Locations



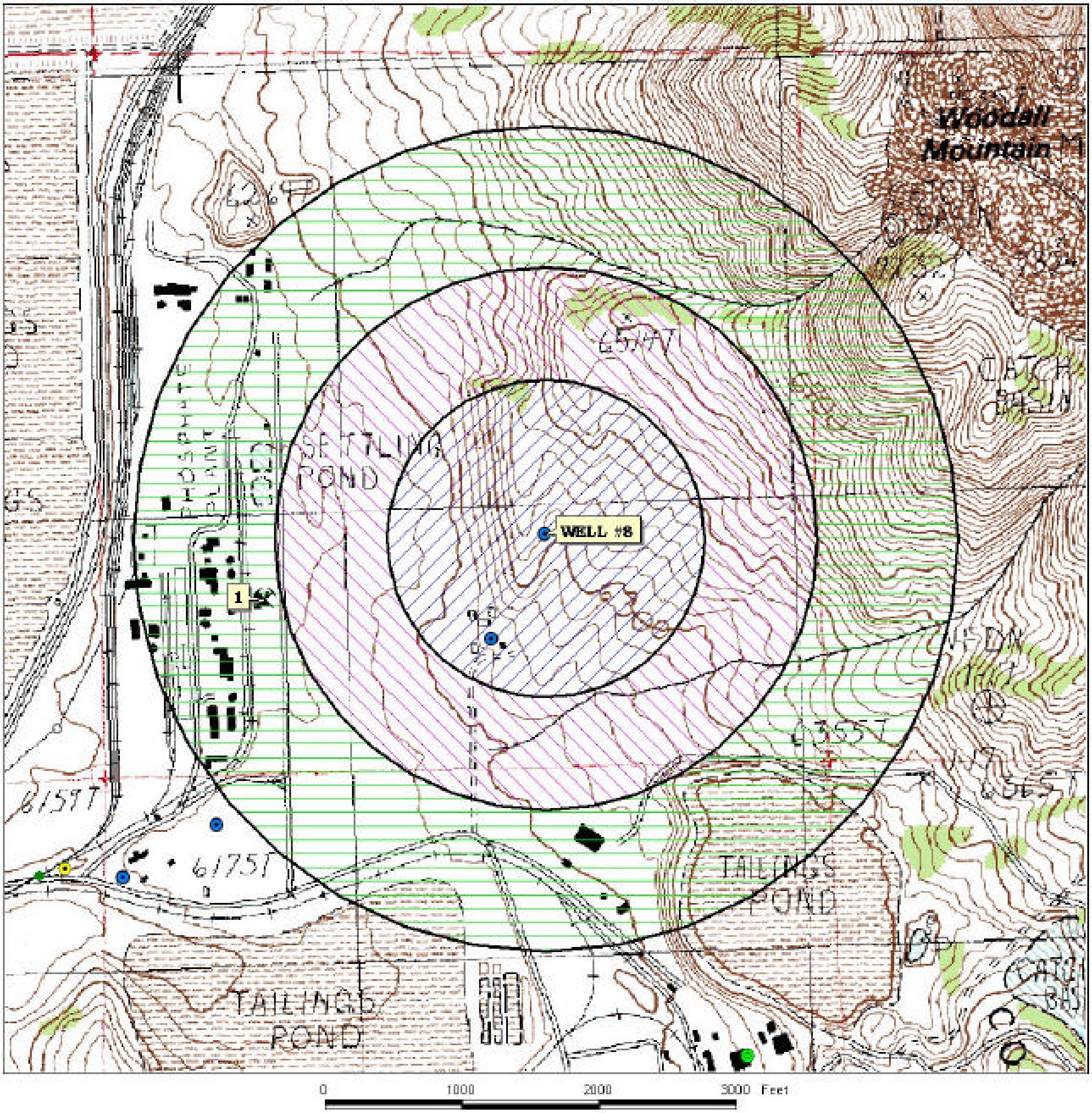
PWS# 6150003
WELL #1

FIGURE 3. Agrium Conda Phosphate Operations Delineation Map and Potential Contaminant Source Locations



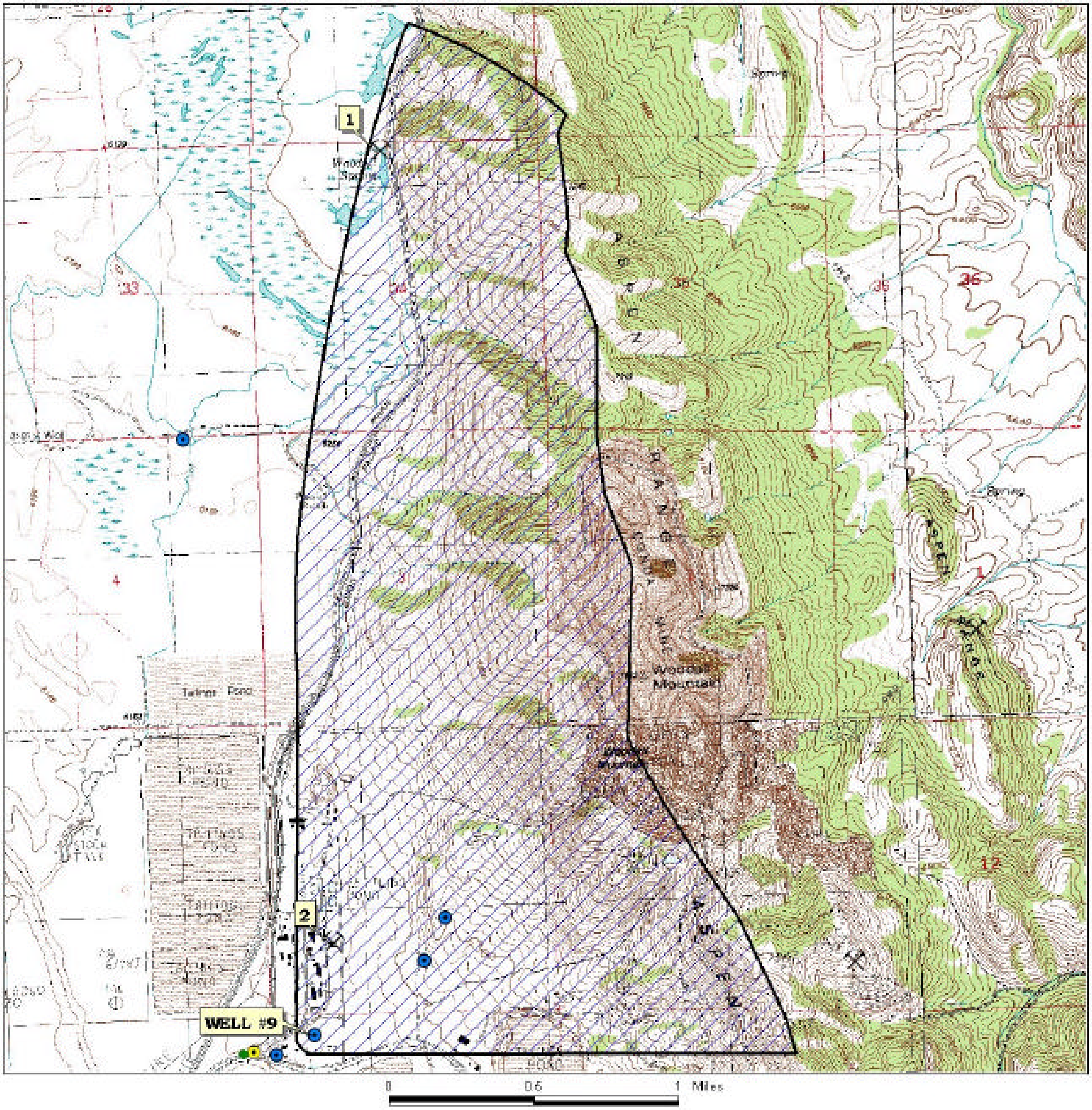
PWS# 6150003
WELL #7

FIGURE 4. Agrium Conda Phosphate Operations Delineation Map and Potential Contaminant Source Locations



PWS# 6150003
WELL #8

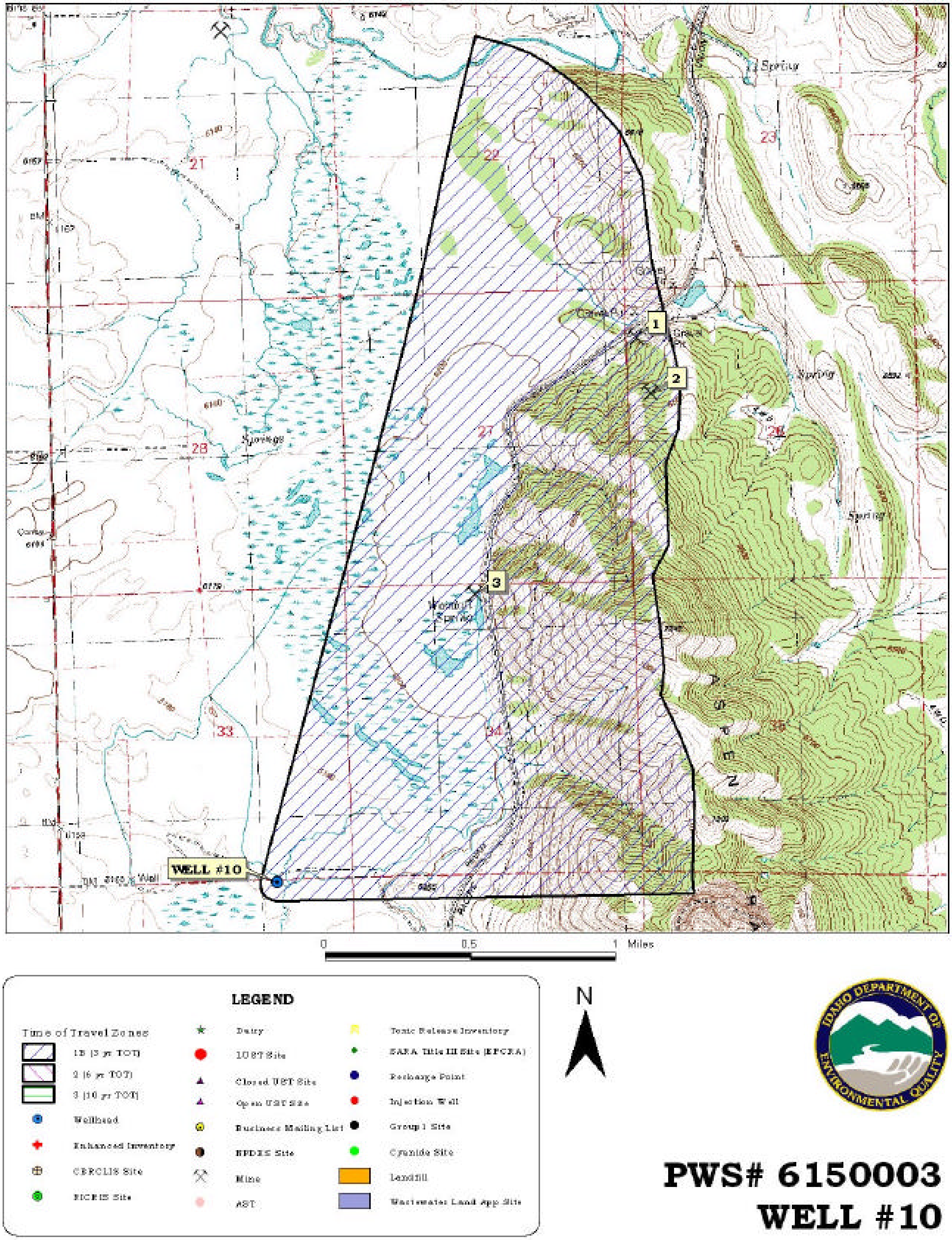
FIGURE 5. Agrium Conda Phosphate Operations Delineation Map and Potential Contaminant Source Locations



N

PWS# 6150003
WELL #9

FIGURE 6. Agrium Conda Phosphate Operations Delineation Map and Potential Contaminant Source Locations



Appendix B

Agrium Conda Phosphate Operations Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) Well #1, Well #9, Well #10: VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use X 0.273)

   Well #7, Well #8: VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use X 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use X 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

1. System Construction

		SCORE
Drill Date	10/13/1964	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1999
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	NO	1
	Total System Construction Score	6

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
	Total Hydrologic Score	6

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED AGRICULTURE	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	YES	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	4	4	4	1
(Score = # Sources X 2) 8 Points Maximum		8	8	8	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	2	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		13	11	13	4
Cumulative Potential Contaminant / Land Use Score		17	13	17	6

4. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	17	16	17	14
5. Final Well Ranking	High	High	High	High

1. System Construction

		SCORE
Drill Date	09/30/1988	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	NO	
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	NO	1
Total System Construction Score		6

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		6

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED AGRICULTURE	2	2	2	2
Farm chemical use high	YES	0	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	4	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	YES	4	0	0	
4 Points Maximum		4	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		8	2	2	2

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		4	4	4	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0

	IOC Score	VOC Score	SOC Score	Microbial Score
Cumulative Potential Contaminant / Land Use Score	17	11	13	4
4. Final Susceptibility Source Score	15	14	15	14
5. Final Well Ranking	High	High	High	High

Ground Water Susceptibility Report   Public Water System Name : AGRIUM CONDA PHOSPHATE OPERATIONS   WELL #8
Public Water System Number 6150003   06/13/2002 3:06:38 PM

1. System Construction		SCORE			
Drill Date	09/23/1992				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	NO				
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	NO	1			
Total System Construction Score		5			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED AGRICULTURE	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	YES	4	0	0	
4 Points Maximum		4	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		8	2	2	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		2	1	1	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		17	8	10	4
4. Final Susceptibility Source Score		14	13	13	13
5. Final Well Ranking		High	High	High	High

Ground Water Susceptibility Report   Public Water System Name : AGRIUM CONDA PHOSPHATE OPERATIONS   WELL #9

Public Water System Number 6150003   06/13/2002 3:11:11 PM

1. System Construction

		SCORE
Drill Date	02/20/2000	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	NO	
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	NO	1
Total System Construction Score		6

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		5

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED AGRICULTURE	2	2	2	2
Farm chemical use high	YES	0	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	4	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	4	4	4	1
(Score = # Sources X 2) 8 Points Maximum		8	8	8	2
Sources of Class II or III leacheable contaminants or	YES	5	1	1	
4 Points Maximum		4	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	2	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	11	13	4
Cumulative Potential Contaminant / Land Use Score		18	13	17	6

4. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	16	15	16	13
5. Final Well Ranking	High	High	High	High

Ground Water Susceptibility Report | Public Water System Name : AGRIUM CONDA PHOSPHATE OPERATIONS | WELL #10
Public Water System Number 6150003 | 06/13/2002 3:15:46 PM

1. System Construction

		SCORE
Drill Date	unknown	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	NO	1
Total System Construction Score		6

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		4

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED AGRICULTURE	2	2	2	2
Farm chemical use high	YES	0	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	4	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	4	4	4	1
(Score = # Sources X 2) 8 Points Maximum		8	8	8	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	2	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		13	11	13	4
Cumulative Potential Contaminant / Land Use Score		15	13	17	6

4. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	14	14	15	12
5. Final Well Ranking	High	High	High	Moderate